National Institute of Environmental Health Sciences

Spatio-temporal variation of tick-borne encephalitis (TBE) incidence in the Czech Republic: Is the current explanation of the disease's rise satisfactory?

Author(s): Zeman P, Pazdiora P, Benes C
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Abstract:

A marked increase in tick-borne encephalitis (TBE) incidence has been observed in Europe during the last 2 decades. Hypothetical causes include global climatic fluctuations, human-induced environmental changes, and socio-economic changes. These factors are thought to be disproportionately relevant in different geographical areas. To date, epidemiological studies of this phenomenon were based primarily on aggregated data, and little is known about TBE dynamics on the detailed geographical scale. This study is aimed at the subregional variations of incidence of TBE in the Czech Republic. The methodology of spatial statistics was applied. Over 13,000 cases of TBE, registered 1971-2007, were pinpointed on a GIS map and analysed for density variations in both time and space. Selected areas were studied in detail, using time series analysis. These analyses revealed that the incidence of TBE was highly variable both across the country and over the study period. Although the aggregate total of reported cases were generally increasing, local trends were divergent. A detailed study of one endemic area (that one with the highest case density level) showed that heterogeneities are detectable, even on a very fine geographical scale. There was no evident spatial coherence of the TBE trends; and some adjacent areas showed quite differing trends. However, countrywide coherence was demonstrated for quasi-octennial fluctuations in the TBE series, associable with the North Atlantic oscillation. The possible influences of both various climatic and population covariates upon TBE occurrence are discussed. However, the geographical heterogeneity of the disease trends, at such a fine spatial scale, cannot be explained satisfactorily by fluctuations in climatic or socio-economic conditions.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Geographic Feature:

resource focuses on specific type of geography

General Geographical Feature

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Czech Republic

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Tick-borne Disease

Tick-borne Disease: Tick-borne Encephalitis

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children, Elderly, Low Socioeconomic Status

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content